NEVARC NEWS VK3ANE

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The monthly magazine of the
North East Victoria Amateur Radio Club http://nevarc.org.au/

An affiliated club of the Wireless Institute of Australia

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Next Club Meeting
Sunday 11th August
Belviour Guides Hall, 6 Silva Drive West Wodonga

Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards
Members are encouraged to turn up a little earlier for clubroom maintenance
Call in Via VK3RWO, 146.975, 123 Hz tone

NEVARC came 4th place in its first club portable operation. Not bad for a first attempt.

NEW ASSESSMENT AND LICENSING PROCEDURES

Despite what you may have seen or heard in Amateur circles the basic process has not changed, now that Australian Maritime College (AMC) runs the Amateur Radio Assessments on behalf of ACMA. To obtain an Amateur radio licence the following is required:

There is a syllabus for each grade of licence issued by ACMA.
You either do a course of study or self-study to learn the required theory and regulations. When you feel competent to sit for the assessments you contact an AMC Amateur Radio Assessor to arrange a suitable time or enrol to do the NEVARC Foundation Course which has arranged with AMC assessors to provide assessments after the course.

The elements of the assessments consist of, Practical, Theory and Regulation relevant to the grade of licence being assessed. The practical is included at no extra charge for all grades. If you are upgrading your licence level the practical is not required if you have passed it before. If you are upgrading from the Standard to Advanced level and have not sat the practical before you will have to sit the practical assessment. (ACMA Requirement)

The AMC Assessment process

1. Contact an AMC Amateur Radio Assessor (this can be done through the AMC website or VIA NEVARC)
2. The AMC assessor orders an exam pack from AMC.
3. The candidate sits the assessments.
4. The exam pack is returned to AMC for marking of the Theory and Regulations papers, the practical is assessed by the AMC assessor along with the assessment papers the candidate returns a recommendation for a call sign form and an ACMA application for a licence form.

There is a cost of $90 per exam component (theory, regulations, practical). This is paid direct to the AMC using credit card authorisation on your exam papers. If you are successful AMC issue a certificate of proficiency and forwards your licence application to ACMA. NOTE that as before ACMA issue an email invoice for the license fee, this fee can be paid on line. Once paid your licence detail will come up on the Radiocommunications data base. From there you can download your licence details and print out a copy of your licence. (You are required to display a copy of your licence at your station)

ACMA DO NOT SEND OUT PAPER LICENSES ANYMORE.

So you might ask what has changed, answer is, only the AMC paper work and procedures. If you have any further questions, or need classifications contact education@nevarc.org.au

Frank VK2BFC
NEVARC Education Officer
AMC Amateur Radio Assessor
vk2bfc@bigpond.com

AMC Amateur Radio Licence Exam Service Update

AMC Amateur Radio at the Australian Maritime College is responsible for the management of all functions associated with amateur radio examination services in Australia. The services will include the management of the assessor network across Australia, and distribution of examination papers and certificates for the following levels of proficiency: Foundation, Standard and Advanced.
In addition, AMC Amateur Radio will make callsign recommendations on behalf of successful candidates to the ACMA.

Re-issuing Certificates of Proficiency
AMC Amateur Radio will also be responsible for reissuing certificates to holders who have lost or damaged certificates of proficiency.

Unit of Competency
The issuing of an Amateur radio qualification based on a valid unit of competency will be included in AMC Amateur Radio's business services.

Practical Component
A practical component is included in the examination process. Applicants should discuss the practical process with the assessor conducting their examination.

See more at http://www.amc.edu.au/industry/amateur-radio

Space junk or sabotage?

Space clean-up drones could have military implications.
A recently declassified Chinese report reveals it is building tiny robotic satellites. And they can either save — or destroy — the space race. China calls them scavengers, Russia calls them inspectors and the US calls them threats.

The race is on to clean up the space junk orbiting above our heads. But fears are these trash collectors are really killer "gremlins". Touted as space-junk clean-up drones, they also have the potential to grab vital GPS, communications and surveillance satellites — and send them hurtling towards the ground.
And strange things are already happening in orbit. Analysts are asking: is it space junk, or sabotage?

Several critical geostationary orbit satellites have been reporting anomalies. Most recently, Intelsat 29e — which provided communication and navigation services to the Caribbean and North Atlantic — "experienced damage that caused a leak of the propellant on board the satellite".
Nobody is yet suggesting sabotage. Space junk remains the number one suspect.

But as the satellite was only three-years-old, and joins five other major satellite malfunctions in the past two years, the incident has started analysts talking.
Is space junk already getting out of control? Or is something more sinister at play?

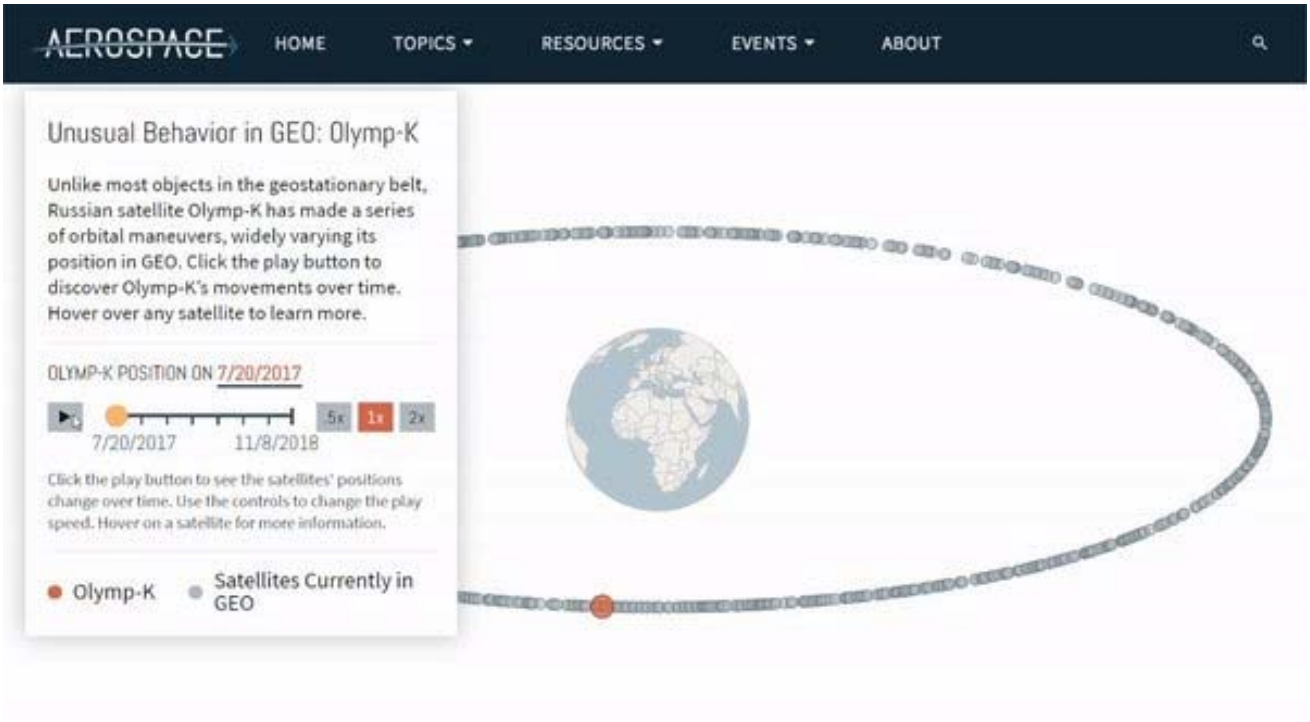
According to the Massachusetts Institute of Technology (MIT), attacks against satellites may have already happened.

COLLISION COURSE

Last year, fears Moscow was developing a secret satellite saboteur were renewed when what was initially believed to be a piece of space junk left over from a rocket launch began to behave abnormally.
It was changing course and speed under its own power. And it was doing so just days after US Vice-President Mike Pence formally announced plans to create a new Space Force.

Why would it do this? Why the secrecy? Was it some sort of message?

Now, Beijing has declassified tantalising details of what it calls an artificial-intelligence controlled space clean-up project.
The so-called scavenger program was confirmed in state-controlled media by Luo Jianjun, deputy director of the National Laboratory of Space Flight Dynamics Technology at Northwestern Polytechnical University in Xian.
"We prefer not to talk about it publicly," he said.
But talk about it he did.



Unlike most objects in the geostationary belt, Russian satellite Olymp-K has made a series of orbital maneuvers, widely varying its position in GEO.

ORBITAL PICK-UP

Referring to the uncontrolled crash of the Tiangong-1 experimental space station last year, Mr Luo said the use of newly developed technology could guide such craft to burn up in the Earth's atmosphere safely.
According to the South China Morning Post, he said the project was still experimental and that there had been no large-scale deployment of such orbital robots.
The project involves small satellites — some weighing less than 10kg — with robotic arms and small thrusters. Their sensors and thrusters enable them to approach within 20cm of an object before reaching out and grabbing it.
This could be a cast-off rocket casing. An old satellite with a dead power source. Or a fully-functional military or commercial device.
Once attached, the scavenger can then set about pushing it towards the Earth's atmosphere — and a fiery fate.
"Most details remain secret because of the technology's potential military applications," Mr Luo states.

WEAPONISED GARBAGE TRUCKS?

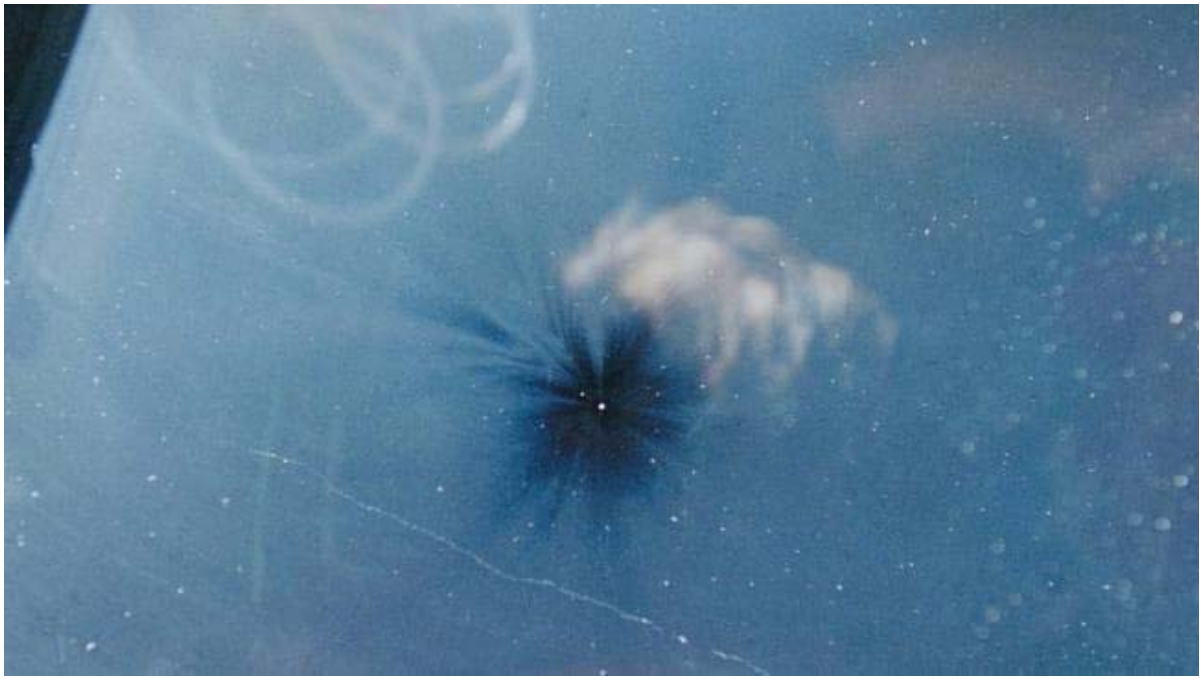
The *Morning Post* also quoted a recently declassified Communist Party document as saying the concept of orbital drones had been under development since 2008.
"The project has not only found applications in more than 10 satellite models … but also drones, smart weapons and robots," the document reads.
The Centre for Strategic and International Studies (CSIS) states in its 2019 Space Threat Assessment that a Chinese experimental satellite, designated SJ-17, circled a Chinese communications satellite several times in 2017 and 2018.

Any military objective could be similar to that of Russia.
The small robotic devices hide among space junk — or even attached to a bigger object. Here they remain, powered down until awoken by a coded call.

This is because every rocket launch is carefully observed by competing governments and corporations. Whatever ends up in orbit is accurately tracked and recorded — not least to determine if it could end up hitting some high-value target, such as the International Space Station. But only the most sensitive and comprehensive space junk tracking systems would be capable of detecting the strange appearance or shift in the course of an object so small.
These grapple-equipped gremlins can then pass close to a satellite of interest, photographing and scanning its make-up, or even intercepting its signals. They can also tear away at its surface, damaging sensitive equipment and rendering the satellite useless.
Or, they could grab a dead satellite and propel the junk out of orbit.

BATTLESPACE

In March last year, India launched a missile that successfully destroyed a satellite already in orbit. It is only the fourth nation to do so.
But there was fallout: a great cloud of metallic debris cannoning through space.
Some pieces are just millimetres across. Others, tens of centimetres. All can rip holes in propellant tanks, depressurise a spacecraft — or smash another satellite, causing yet another cloud of debris to erupt.



Views of the overhead flight deck window showing debris impact damage due to high velocity impact strike by space debris.
Picture: NASA

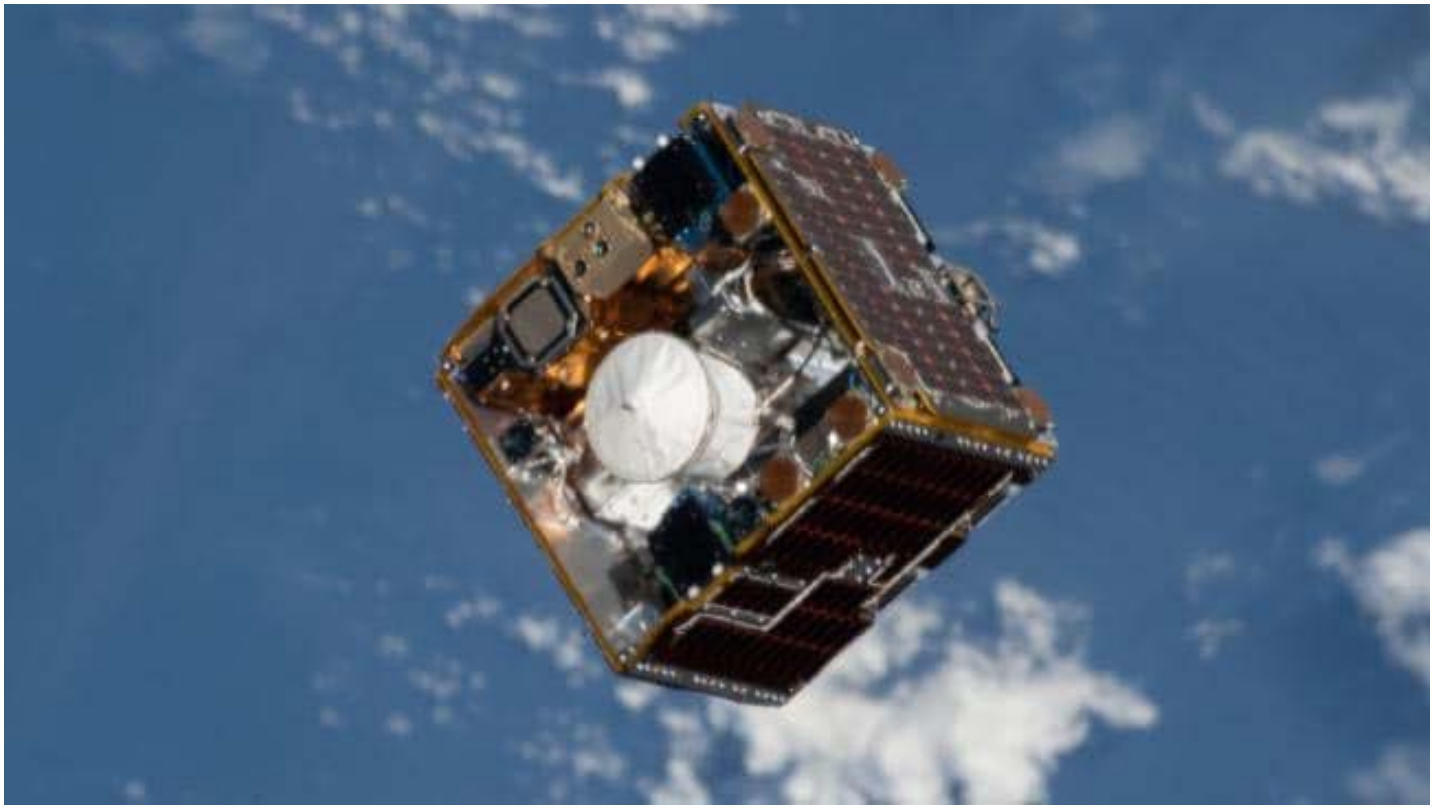
It joins a hail of some 3000 high-velocity fragments — all of which are being tracked — caused when China conducted a similar 'kinetic-kill' test in 2007. It's estimated a total of more than 600,000 pieces are cannoning about up there.

The risk is, such debris could initiate a runaway chain reaction.

It's called the Kessler Syndrome, after the researcher who first predicted it.
And, some academics are warning it could soon close access to high orbit within as little as 20 years.

"If the useful orbits around Earth become too full of rubbish, and our satellites can't operate safely, it will have serious implications," the Australian Academy of Science warns.

And space agencies around the world, including Australia, are racing to find ways to mitigate the problem.
Some, such as the space nets being tested by Britain and repair robots proposed by the US, could also be construed as weapons.



Deployment of the NanoRacks-Remove Debris Satellite from the International Space Station (ISS). NanoRacks-Remove Debris aims to demonstrate key technologies to remove space junk.
Picture: NASA

'SOFT' OPTIONS

There's no point winning an orbital war if nobody could ever leave the surface of the Earth again for several thousand years.
Which is why the militaries of such nations such as China, Russia and the United States are looking for less destructive ways to dominate space — including gremlin satellites.

Militaries are exploring other options, such as Russia's recent controversial jamming of GPS satellites operating above Norway and Sweden.

And then there are lasers.

While not yet capable of shooting an object out of space, they can damage or blind the sensors they carry.
"It's happening all the time at this low level," Centre for Strategic and International Studies Aerospace Security Project head Todd Harrison told *MIT Technology Review*. "It's more grey-zone aggression.
Countries are pushing the limits of accepted behaviour and challenging norms. They're staying below the threshold of conflict."

~Internet

Le Grand K

The way we measure weight fundamentally has changed and while many Australians won't have noticed, it has important consequences for things we use every day. The standard upon which international measures were based was a single cylinder of platinum alloy sitting in a vault outside Paris.

A replica of the International Prototype Kilogram at the International Bureau of Weights and Measures.

Weighing a purported one kilogram, it was known as "Le Grand K".
However, the problem was it was not exactly one kilogram - the object was slowly losing tiny amounts of mass.
Over time, the official measure of a kilogram would not actually weigh one kilogram.

To solve the issue, international scientists agreed in November last year to redefine the kilogram based around a fundamental force of the universe called Planck's Constant.
Dr Bruce Warrington is the chief metrologist and CEO of Australia's National Measurement Institute, which holds the two official Australian copies of Le Grand K and is responsible for setting the nation's weights and measures.

He said that while unfortunately our bathroom scales were not going to suddenly read differently, there would be a number of ramifications to the change in how we measure a kilo. "Most people won't notice any change at all, you'll weigh the same as you did before the change," Dr Warrington said. "There are some fields where the change will come reasonably quickly, particularly if you're measuring very small masses at the milligram scale. "The new definition lets you make those measurements more accurately.
"So that's important for things like the pharmaceutical industry, for example."

But Dr Warrington said the big payoff was in the longer term, opening possibilities that were previously not possible with a physical kilo setting the world standard.
He pointed to atomic clocks as an example of a technology that seemed unnecessary at the time, but eventually allowed enough timing accuracy to allow highly specific real-world functions like GPS navigation.
"The best applications of these new changes will be things we haven't even thought of yet, as new technologies come into play," he said.

A Kibble Balance at the National Institute of Standards and Technology in Gaithersburg, Maryland

Planck's Constant describes the behaviour of particles at the atomic level, and relies on three measures - the second, the metre and the kilogram. The second and the metre are now defined by the speed of light, which means they can be used to calibrate exactly one kilogram using a device called a Kibble Balance, which uses an electromagnet to pull against gravity with exactly one kilogram of resistance. But as we march forward into the future of measurement, what happens to Le Grand K?
"The international prototype still has value for understanding mass measurements, but now that we have a completely independent way to measure mass we can keep an eye on the history of that artefact and understand how it has been changing in a way we haven't been able to before," Dr Warrington said. "In the end it becomes a historical artifact, in the way we still have the original One Metre Bar, but it's a museum piece now rather than a working standard."

~Internet

THE BENDS AT 80 METERS BY RICHARD, K4KRW

In recent years I had been running a fan dipole cut for 80 meters and 40 meters. The 80 meter legs used a coil as I did not have 130 feet of room for a full size 80 meter dipole. The antenna was about 70 feet long and had worked well for me but the 80 meter part had a very narrow bandwidth. I had also been thinking about making an 80 meter doublet to replace the dipole but again needed more room. When I saw this article I thought “what the heck” and dove in (I had to tie in diving somehow).

An up-front warning to anyone else who wants to try this antenna. It requires a lot of wire. This was not made clear in the article. The article starts out with him describing building a dipole with 130 feet of wire (standard length for an 80 meter dipole) and ending up with an antenna about half that length. The only other hint in the article about the amount of wire required was the author speculating that the extra wire may improve reception. I will also warn you that making this antenna is also extremely tedious work. Also, I have to say that I learned once again that every compromise has its price.

Before I took on the task of building this antenna I had purchased 150 feet of 16 gauge copper clad steel thinking that would surely be more than enough. I wanted the steel even though it is harder to bend as I didn’t want the wire to get mangled if the antenna hit a branch.

I followed the author’s recommendation to start with 25 degree bends with the ‘triangles’ being 1.5 inches in height. According to his formula this would reduce the length of the antenna to 50% of its normal length (hopefully around 65 feet). I built a jig using a 4-foot-long 2 by 6 and about 120 6d 2 inch finishing nails. There were two rows of nails that were 1.5 inches apart. The nails in each row were 2/3 inch apart. The nails in the two rows were offset by 1/3 inch. There were enough nails to create 3 feet of Sabertooth wire at a time. I put a few extra nails on each end of the jig to assist in starting the next series of bends and to give me a place to tie the cord to hold it in place while I was zip tying the wire to the cord. Here is the jig:

While making the jig it quickly became clear to me that 150 feet of wire was not nearly enough. After a little math it looked like I would need 307 feet of wire. So since I had 150 feet of wire, I bought another
150 feet. I would use what I had and extend it if I needed to.

Once formed, the author recommended covering the wire in heat shrink tubing to hold its shape. I really could not imagine getting that wire into a 35 foot long piece of heat shrink tubing with the correct spacing maintained. Instead, I decided to zip tie the wire to the cord that would suspend the antenna. The author had done this with his original prototype. I used Black UV resistant wire ties.

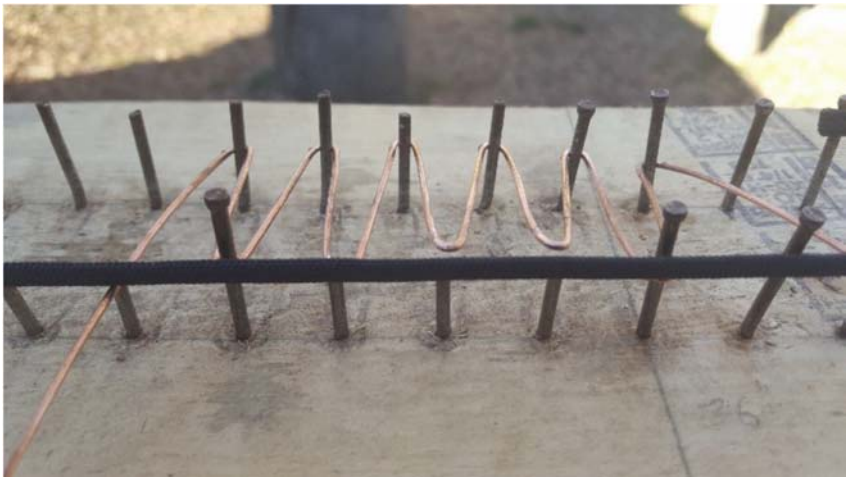
I started bending the wire and quickly decided that I could not do this by hand. I got thinking about some type of wire wrapping tool. I could not find anything suitable, so I made one myself. I bought a long
4mm, ¼ inch drive socket. I used a Dremel tool with a cutting wheel to remove material from the end of the socket leaving a small nub to grab the wire. I also had to drill out the interior so it would fit over the nail heads. I mounted the socket to a screwdriver handle having a socket adapter. I could then just place the wire next to a nail, put the socket over the nail and the knub over the wire and then turn the socket to wrap the wire around the nail. It worked perfectly.

I started bending wire on a Saturday. I spent most of the morning creating the jig and then the wire wrap tool. In the afternoon I managed to create 6 feet of Sabertooth wire. Sunday I finished bending the first 150 feet of wire. This resulted in a section of Sabertooth wire 31 feet 6 inches long.

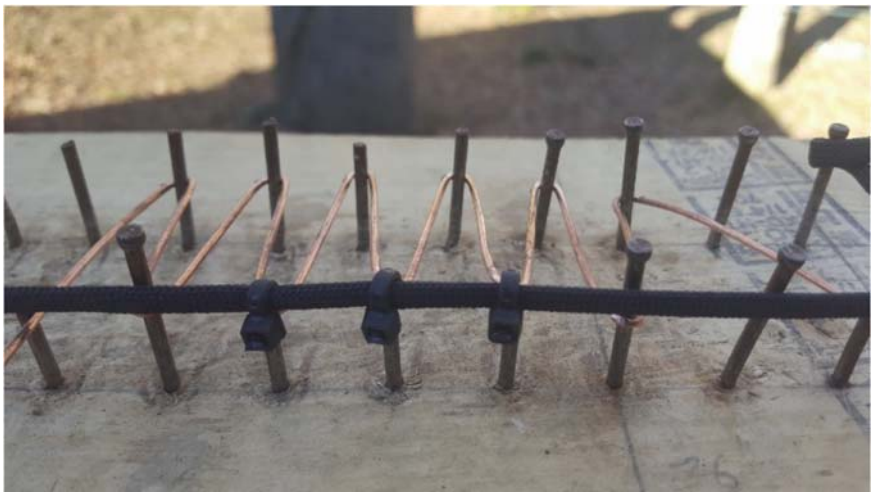
As I figured out the best way to work with the jig things went faster. I also made modifications to the jig to speed things up. Using a Dremel cutting wheel, on the row of nails away from me, I removed all of the heads. On the row of towards me I cut three out of four of the nails down to ¼ inch long. That left every 4th nail full length. I did not cut the head off of those nails as I wanted them to keep the wire in place while I zip tied the wire to the cord.

The following picture shows a short section of wire bent on the jig in its final form.

The following picture shows where I have pried the wire up using an old flat blade screw driver and the wire is ready for fastening to the cord where the short nails are. I wrapped the cord around nails at each end of the jig to hold it in place for the zip tie process.

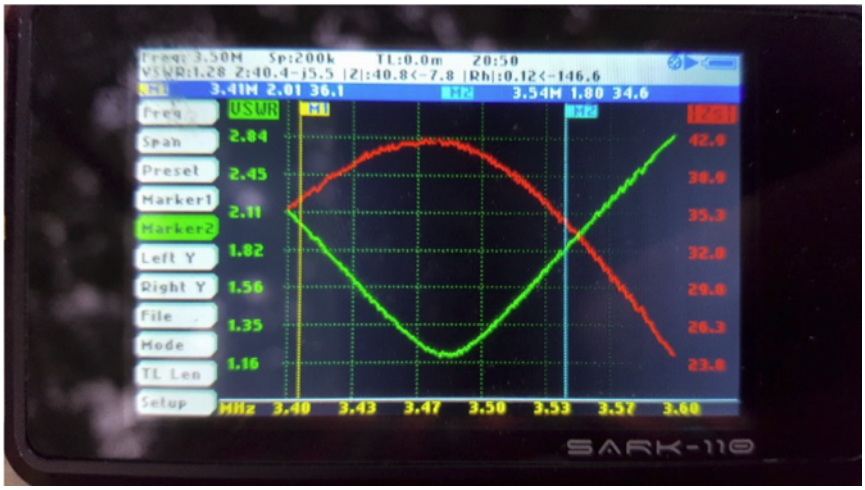


In the following picture the wire is zip tied to the cord. Once the wire suspended over all of the short nails was zip tied, I could then pull the rest up off the jig and zip tie where the taller nails were. I used a small set of needle nose pliers to pull the zip ties tight before cutting off the waste.

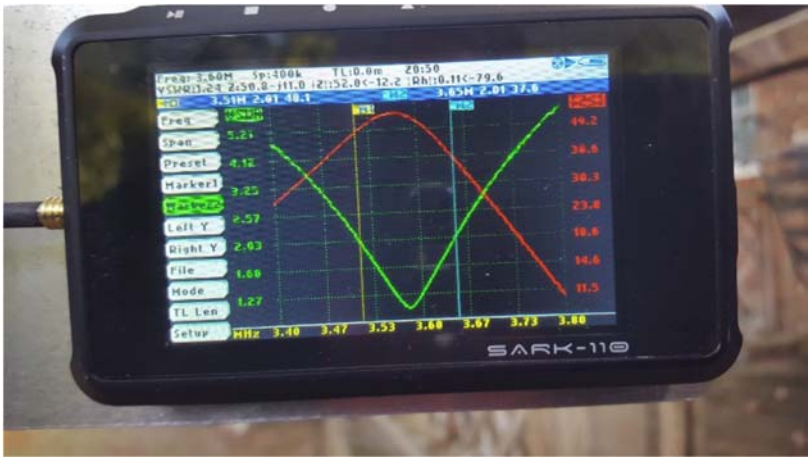


The next weekend I bent the other 150 feet. My best time for creating 3 feet of wire was 20 minutes. Normally it was more like 30 minutes. Once I had both legs created I quickly assembled a dipole and raised it. A friend had loaned me his Sark 110 antenna analyser. Wow! What a great tool. After all of this bending I found that the antenna tuned at 4.79 MHz Ugh. Yes, 300 feet of wire was not enough. Actually, I thought it would be a little short. But, I thought I would be a lot closer than I was at this point.

I visited the wireman at a local Hamfest the next weekend and bought another 50 feet of wire. After bending and adding that I was now up to a 72 and a half foot antenna and it now tuned to 4.07 MHz
I truly was thinking I would call it quits. I thought the antenna was getting too long to fit where I needed it to go. But, curiosity got the best of me and I ordered another 100 feet of wire. I used 50 feet of the wire to extend the antenna once again. Now it was 84 feet long and it tuned to 3.48 MHz Finally!



One note here. I ended up having to extend the cord that the Sabertooth wire was attached to. So, there are knots in the cord. If I ever did this again, I would start with a much longer cord to allow for this unexpected additional length.
Now that I was close to my target frequency, I cut about 6 inches off of each end of the antenna. Now the antenna was 83 feet long and tuned at 3.560. The SWR 2.0 bandwidth spanned from 3.510 to 3.650 MHz Perfect.



So, in the end, the antenna was certainly not 65 feet long. In the end I used 400 feet of copper clad steel wire rather than 130 and I also used about 1500 wire ties. Here is a picture (next page) of the wire tie waste about half way into the antenna. That is a large Starbucks coffee cup.

But, the antenna is also not 130 feet long. The antenna just did fit where I wanted to hang it. I played with the antenna for about a week as a simple dipole. I then wanted to compare apples to apples so I added 40m legs so I could compare the Sabertooth wire to my old fan dipole.

I then spent the next two weeks playing with the antenna. I decided to use the Reverse Beacon Network to compare this new antenna to my old one. Of course, the bands had been lousy. But, I got about 2 weeks' worth of readings. I would call 'test de K4KRW' 5 times on 80m and 40m using a frequency where both antennas tuned well. I tried to do this around 6:00 am and then again around 9:00 PM each day. Work and family obligations made the mornings difficult. I did get most of my evening tests in. After two weeks I took down the Sabertooth Wire antenna and put up the old antenna and tested against the reverse beacon network for another week.

The numbers from the Reverse Beacon Network were interesting. I don't have nearly enough data to say that this is conclusive evidence. But, for stations where I had 3 or more RBN hits on 80 meters in the morning or the evening with both antennas the new antenna did have consistently better signal to noise ratios than my old one with the coils.

Of course it is entirely possible that the bands were just better on the days I was testing the new antenna. I wish I had room to hang both antennas do direct comparisons.

Using the new antenna as a fan dipole, the new antenna didn't seem very different on the low bands from the old antenna. This is a good thing as the old antenna really had served me well. I love playing in the NAQCC sprints and I consistently get good scores. In the November sprint I hopped in late on 80 meters running 5 watts with the new antenna and had a small pileup. I got my first 7 contacts in 14 minutes. I ended up with 14 contacts over an hour's time. I played in the CQWW CW contest and managed to get into Europe pretty well on 80m (100 Watts). In the December milliwatt sprint I got my second highest score ever in that event. My score was entirely from operating on 80 meters as 40 was horrible. I was running 900 mW. Considering how bad the bands were that evening I was very pleased with my 13 contacts in 11 states.

On the 30th of December, I noticed that the jacket of my RG-8X running to the dipole was cracked near one end of the line. The coax was pretty old. I had wanted to switch to a balanced transmission line and had even already bought 300 Ohm window line and a DX Engineering 1:1 balun.

I got to work replacing the coax. I ran 64 feet (1/4 wavelength at 80 meters) of window line under the house to get to my operating station. I ran 96 feet (3/8 wavelength) of window line from the back of the house to the antenna. I did this so I could operate from my back deck with 3/8 wavelength of window line or from my main station with 5/8 wavelength of window line. The odd multiples of 1/8th wavelength minimize the chance that my tuner won't be able find a match.

I put a mild twist in the window line and made sure it was properly suspended and did not run parallel to any house wiring. I ended up with 10 feet of new coax running from the balun to my station in the house. I removed the 40 meter sections of my fan dipole and attached the window line to the Sabertooth wire.

I finished putting everything together just in time for Straight Key Night. I had 7 nice QSOs over the 24 hours.
I then did some casual operating and participated in the January NAQCC sprint. For the sprint I got 10 contacts of 40 meters and another 22 on 80 meters. It was a fun night.

While 80 meters and 40 meters seemed fine, I wasn't sure about how the antenna worked on the higher bands. Being a doublet, I was hoping it would work pretty well. With the bands being so lousy and me mostly operating at night, I really didn't yet have any way to know. I got my chance to find out during the CQ WPX RTTY contest. As I expected, 40 meters seemed to work fine. But 20 meters was another story. I was hearing S7 and S9 signals and I could not get back to them. Then I switched over to my vertical.

I have a Cushcraft MA-6VA which I won at a local Hamfest. This vertical is very much a compromise antenna. It has no radials. It is only about 15 feet off the ground. It is basically a vertical off-centre fed dipole except for 6m where it works as a ground plane antenna. In the past, signals were generally stronger and I could get back to stations more easily with my dipole. But, I have found the vertical useful at times when it's lower take-off angle made it in some situations 'out do' my dipole. I once got a contact with Antarctica by transmitting on the vertical and listening on the dipole. That was fun.

So, back to 20 meters. In the RTTY contest I did make a few contacts on 20 meters with the new dipole. But with most stations I called and called in vain. I would switch to the vertical and pow, I had them on the first call. Again, this vertical antenna used to be regularly outperformed by my old dipole. So, this is where this deal with the devil fell apart. The price for getting an 80 meter doublet to fit in 83 feet by bending wire in this way was losing 20 meters and up. I don't have enough contacts on 30 meters to say whether it is impacted as well.

Friday, February 15th, I spent a couple of hours replacing the Sabertooth wire with 110 feet of insulated
16 gauge copper wire. Of course, the ends droop about 13 feet. But after operating all weekend in the ARRL DX CW contest I have determined that the more traditional doublet does work great from 80 meters up to at least 15 meters and even there sometimes the vertical wins but most times the dipole wins. Even with 13 feet of wire hanging vertically at both ends, the doublet seems to work quite well.

This exercise took a lot of time, 400 feet of wire and 1500 zip ties. Was it a total waste of time and resources? For me I'd say no just because it was a good learning experience. But I'm pretty sure I would never build one again. My 80 meter doublet made from conventional insulated wire works much better on higher bands and I built it and installed it in an hour and a half.

If you just needed a shortened antenna for 80 and maybe 40 meters, the Sabertooth wire did work. But why go through all of this? So basically, I have 'taken one for the team'. I really think the article about the Sabertooth wire left WAY too much out. Hopefully anyone tempted to try this will benefit from what I have learned.

So long for now. This is Richard 'known 4 knitting radio wire' Dodd (K4KRW). 73

~NORTH AMERICAN QRP CW CLUB, NAQCC NEWS - ISSUE 253 JULY 2019

FREE DV

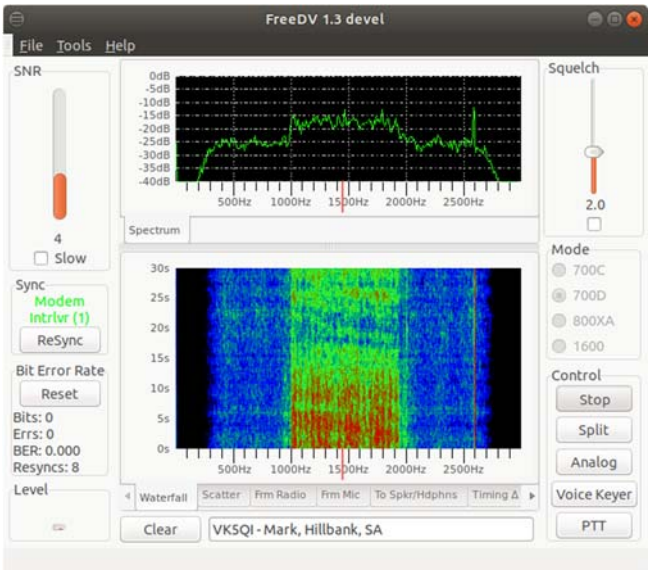
FreeDV is a Digital Voice mode for HF radio. You can run FreeDV using a free GUI application for Windows, Linux and OSX that allows any SSB radio to be used for low bit rate digital voice. There are several reports of the new FreeDV 700D mode outperforming SSB at low SNRs. At high SNRs FreeDV 1600 sounds like FM, with no annoying analog HF radio noise.

Alternatively you can buy a SM1000 FreeDV adaptor that allows you to run FreeDV (1600 mode) on any HF radio without a PC or sound card. If you are a hardware or software developer, you can integrate FreeDV into your project using the LGPL licensed FreeDV API.

Speech is compressed down to 700-1600 bit/s then modulated onto a 1.25 kHz wide signal comprised of 16 QPSK carriers which is sent to the Mic input of a SSB radio. The signal is received by an SSB radio, then demodulated and decoded by FreeDV.

FreeDV was built by an international team of radio amateurs working together on coding, design, user interface and testing. FreeDV is open source software, released under the GNU Lesser Public License version 2.1. The modems and Codec 2 speech codec used in FreeDV are also open source.

FreeDV 700D outperforms SSB at low SNRs – you can get an easy copy of 700D when SSB is unusable.



Amateur Radio is transitioning from analog to digital, much as it transitioned from AM to SSB in the 1950's and 1960's. How would you feel if one or two companies owned the patents for SSB, then forced you to use their technology, made it illegal to experiment with or even understand the technology, and insisted you stay locked to it for the next 100 years? That's exactly what was happening with digital voice. But now, hams are in control of their technology again!

FreeDV is unique as it uses 100% Open Source Software, including the speech codec. No secrets, nothing proprietary! FreeDV represents a path for 21st century Amateur Radio where Hams are free to experiment and innovate, rather than a future locked into a single manufacturers closed technology.

Here is what you need:

A SSB receiver or transceiver
FreeDV software, download links are below.
A Windows, Linux or OSX PC with one (receive only) or two sound cards.
Cables to connect your PC to your SSB radio.

OR:

A SM1000 Digital Voice Adaptor
Cables to connect the SM1000 to your SSB radio

For more see https://freedv.org/

Magnetic loops

I am not going to explain the theory of this antenna since it is very well described in literature and on many web sites but, more practically, I would like to give here an overview of the successful designs I have tested and some useful tricks.

However, just as a short introduction, I would like to remind the key characteristics about these antennas since they are quite different to other more common antennas such as dipoles, verticals, etc and because knowing these differences can help in using them better:

Magnetic component of the electromagnetic field: impact on noise pick-up shape of radiation pattern: think about it when implementing it.

High Q and narrow bandwidth are tighten together, one is desirable (high Q) as it provides to this type of antenna its characteristic efficiency, the other one (narrow bandwidth) is one of the consequences of the high Q but we can learn to live with it!

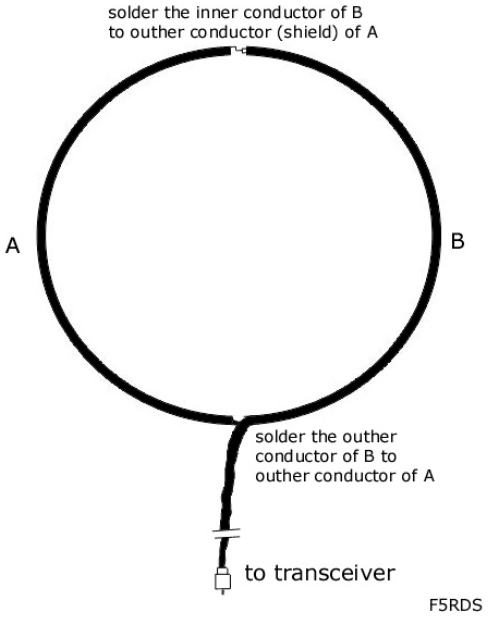
Based on these characteristics, one needs to understand that, under specific circumstances, they can achieve a better efficiency as compared to a classic dipole or a vertical antenna, for example when it is not possible to implement a good grounding system and/or when the space to put a full size antenna is not available. An interesting comparison for example can be: how a magnetic loop can compare with a mobile shortened antenna on a balcony?
To be honest, the answer is not simple, we need to think about bandwidth (frequency can be changed in case of a remote loop), efficiency, available ground system in case of the vertical wipe, etc.…and you can reach different conclusions based on different operator wishes, bands and locations.

There are various situations in which these antennas can be tried and used so I think helpful to indicate first that my interest in these antennas have mainly been to achieve a multiband system that can be used in an apartment either indoor or on the window or balcony, not a fully remote system since it keeps being accessible by hand from time to time, for example to change from one band to another: this can explain the sizes and technical choices I have made.

PRIMARY LOOP
Nothing special to say about the loop itself except that its diameter determines the usable frequency range and the diameter of the tube section used to build the loop h as major impact on its radiating efficiency. Note also that the loop can be made with a copper or aluminium ribbon instead of a tube (in that case, you can replace the perimeter by two times the width of the ribbon in the formulas); in fact, the shape of the conductor does not matter much, what is critical is to provide the biggest apparent diameter or exposed surface for this conductor. Whatever you can use, try to go to the biggest diameter (or width in case of a ribbon) you can achieve knowing that there are obvious limitations in term of weight, mechanical resistance and cost.

FEEDING THE MAIN LOOP
There are many ways to feed a magnetic loop (gamma match, tuning variable capacitor, secondary loop and possibly others).

The coupling loop (secondary loop): I have tested several, but in my quest of multiband loops, the best I have found is the secondary loop, sometimes called the Faraday loop, so all the loops you will see on this page are based on this design. The coupling loop I use is made of RG-58 coaxial according to the following schematic:

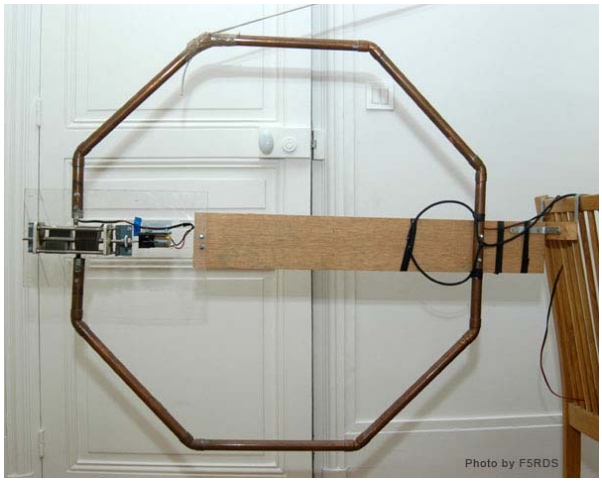


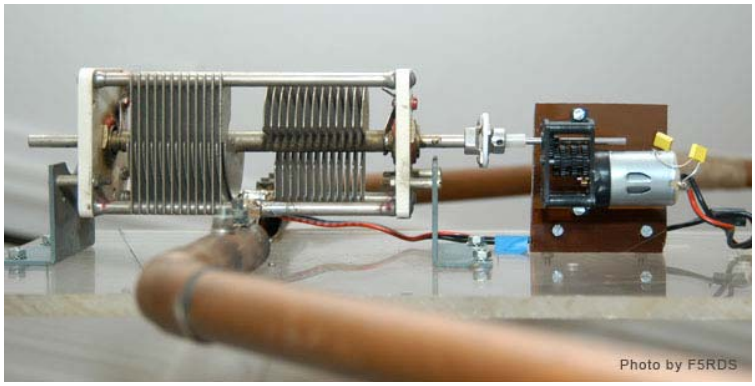
Gamma match: it may be found easier to build and tune and it is certainly the perfect choice for a monoband loop but, to my experience, it is not suitable for a multiband use.

The tuning variable capacitor is fine for multiband use but more complex to build since it requires two variable capacitors with appropriate voltage rating. It means also two driving motors in case of a remote antenna.
However, this can be a valuable option for a portable loop dedicated to a QRP transmitter since you can easily get access to the variable capacitors for manual tuning.

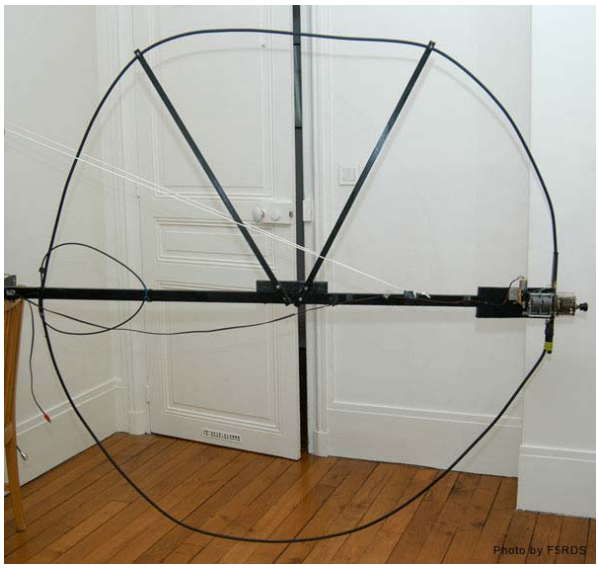
SOME LOOP EXAMPLES

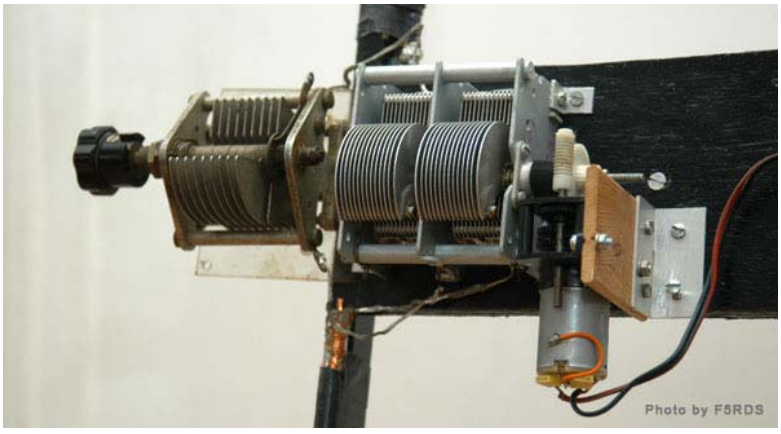
80 CM DIAMETER LOOP FOR 20 TO 10 METER BANDS
This loop is an octagonal in copper tubing of 22 mm diameter equipped with a split stator variable capacitor.





160 CM DIAMETER LOOP FOR 40 TO 20 METER BANDS
This loop is made from RG-8 coaxial and is tuned with one CV for band switching and a second CV for band tuning.
I deliberately took advantage of the softness of the coaxial in the lower part to twist the loop to move it out of the window into its operating position, something that would not have been possible with a rigid loop.
Furthermore, the two arms in V position can be folded on the boom and the loop can be folded for storage.
Not very nice but very handy!





Both loops are remotely tuned with DC motors and appropriate reduction gear.

The two loops have mostly been used either in indoor or attached in a vertical position just as on the pictures on an apartment window, hanging outside, for the curiosity of my neighbours!

VARIOUS TRICKS

Reduce losses: solder everything to keep high Q

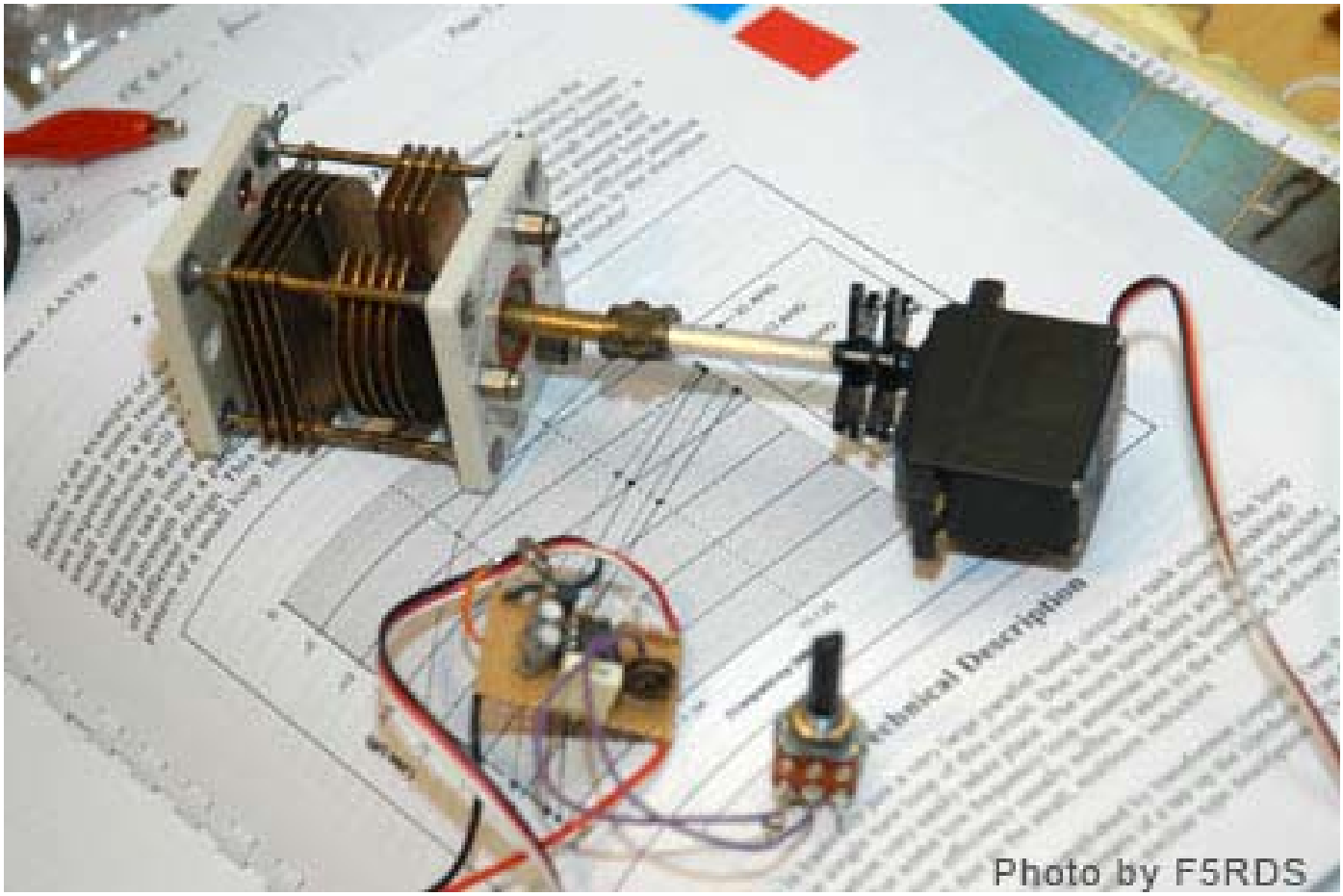
double variable capacitor to tune multibands : one variable capacitor of about 10 pF to tune within a given band and in parallel a variable capacitor of 150 pF to move from one band to another

various variable capacitor configurations : butterfly, pumping variable capacitor, variable capacitor with sliding copper or aluminium foils

simple fixed capacitor :when necessary in parallel to the variable capacitor, a fixed capacitor with high voltage insulation can be built with separated plates made from printed circuit boad cut at the appropriate size and maintained at a fixed distance or appropriate lenghts of coax cable like RG-8 (RG-58 not suitable due to lower voltage insulation)

loop position matters: try to keep them at least half diameter (or even one diameter) away from ground and from magnetic structure. Use vertical position when close to ground. Horizontal position can be used for omnidirectional patern if the loop is high enough (0.25 to 0.5 lambda)

remote variable capacitor requires an accurate and reproducible driving system. DC motors with pulse control circuit and reduction gear are doing a great job at this and are quite simple to build.
Stepper motors are much more complex to use and not so often selected by home builders (but more frequently used on commercial models). Sservo control used for radiocontrol models can be an interesting alternative solution.
Below is just what I am currently testing for my next loop.



I would like to say that these loop antennas have allowed me to be active on some bands in locations where the other types of antenna I tried failed. As always in real life, things are never completely black or white, but with a wide variety of gray nuances, so these magnetic loops are not the only possible answer to all situations and issues, otherwise everyone would be using them today ! If you are enough lucky to live in an area where you can put large, full size antennas, you don't really need them; why would you bother with such narrow bandwidth for example ? But if you are facing antenna restrictions or lack of space on your roof, if you want to put your antenna on your balcony, or if you plan some portable operations without deployed long wires and carrying long masts, or even for the fun of experimenting new things, I encourage you to give it a try, you will be surprised to see that, yes, they work.

SOME CALCULATIONS

F5RDS magnetic loop spreadsheet

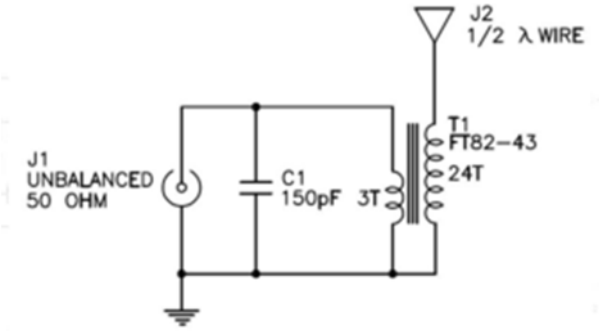
Using this spreadsheet, I have computed and summarized in the table below some design efficiencies just to give an idea of comparative performance between them.

MAIN LOOP DIAM. (CM)	CONDUCTOR DIAM. (MM)	MATERIAL	RADIATING POWER EFFICIENCY (%) / LOSS RELATIVE TO A LOSS-LESS ANTENNA (DB)				
			10 M	15 M	20 M	30 M	40 M
80	10	RG-8	85% / -0.7 dB	67% / -1.8 dB	33% / -4.8 dB	13% / -8.8 dB	4.1% / -14 dB
	20	copper tube 20 mm	92% / -0.36 dB	80% / -0.96 dB	49% / -3.0 dB	23% / -6.4 dB	8 % / -11 dB
	30	copper tube 30 mm	90% / -0.44 dB	86% / -0.66 dB	59% / -2.3 dB	31% / -5.1 dB	11% / -9.4 dB
100	10	RG-8	92% / -0.37 dB	80% / -0.98 dB	49% / -3.1 dB	23% / -6.4 dB	7.7% / -11 dB
	20	copper tube 20 mm	96% / -0.19 dB	89% / -0.52 dB	66% / -1.8 dB	37% / -4.3 dB	14% / -8.4 dB
	30	copper tube 30 mm	95% / -0.13 dB	92% / -0.35 dB	74% / -1.3 dB	47% / -3.3 dB	20% / -7.0 dB
120	10	RG-8	can't work – max 26 MHz	87% / -0.59 dB	62% / -2.1 dB	34% / -4.7 dB	13% / -9.0 dB
	20	copper tube 20 mm	can't work – max 28 MHz	93% / -0.31 dB	77% / -1.2 dB	51% / -3.0 dB	23% / 6-.5 dB
	30	copper tube 30 mm	LIMIT 29.7 MHz	95% / -0.21 dB	83% / -0.8 dB	61% / -2.2 dB	30% / -5.2 dB
160	10	RG-8	can't work – max 19 MHz	can't work – max 19 MHz	80% / -0.99 dB	55% / -2.6 dB	26% / -5.9 dB
	20	copper tube 20 mm	can't work – max 20.3 MHz	can't work – max 20.3 MHz	89% / -0.52 dB	71% / -1.5 dB	41% / -3.9 dB
	30	copper tube 30 mm	can't work – max 21.4 MHz	can't work – max 21.4 MHz	92% / -0.38 dB	78% / -1.1 dB	51% / -2.9 dB

~ F5RDS HOME PAGE

SMALL EFFICIENT MATCHING TRANSFORMER FOR AN EFHW

At FT82-43 matching transformer for an EFHW I wrote about the likely losses at 3.6MHz of a common design using a FT82-43 ferrite core with a 3t primary. In that case, expected efficiency (meaning PowerOut/PowerIn) of the transformer was less than 65% at 3.6MHz.



I have been offered input VSWR curves for such a configuration, and they are impressive… but VSWR curves do not address the question of loss / efficiency.

Note that building loss into antenna system components is a legitimate and common method of taming VSWR excursions, eg TTFD, CHA250, many EFHW transformers, but in some applications, users may prioritise radiated power over VSWR.

Design context / objectives

Objectives are:

used with a load such that the input impedance Zin is approximately 50+j0Ω, Gin=0.02S;

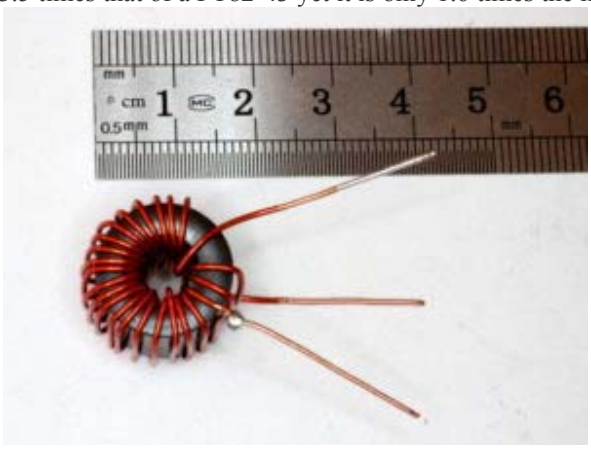
broadband operation from 3.5-30MHz;

VSWR < 2 with nominal 3200Ω load; and

transformer efficiency > 90% at 3.6MHz.

The following describes such a transformer using a Fair-rite 2643625002 core (16.25×7.29×14.3mm #43).

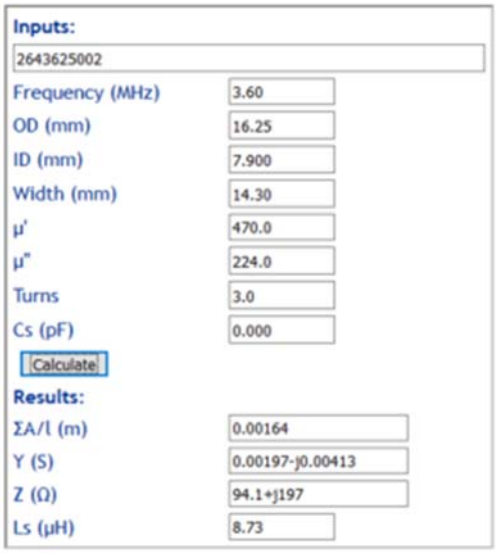
I mentioned in the reference article that the metric ΣA/l captures the geometry, the larger it is, the fewer turns for same inductance / impedance. ΣA/l for the chosen core is 3.5 times that of a FT82-43 yet it is only 1.6 times the mass.



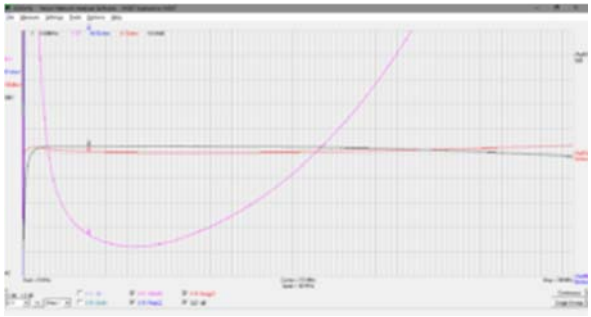
The transformer is wound as an autotransformer, 3+21 turns, ie 1:8 turns ratio.

Uncompensated

Firstly, lets estimate at 3.6MHz minimum number of turns to ensure that magnetising conductance is less than about 0.002S (for better than 90% core efficiency).



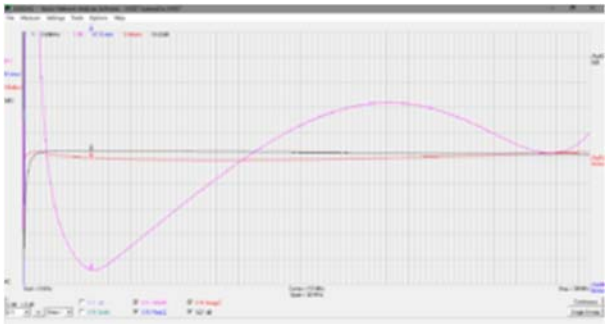
Above, 3t on the primary delivers Gcore<0.002S.



Above is a sweep of the uncompensated prototype with a 3220+50Ω load. Let work through a loss analysis.
Because of the division of power between the 3220Ω resistor and VNA input, there is effectively an attenuator of -10*log(50/(50+3220))=18.16dB, so |S21| has a component due to this division. Lets call this element the LoadAttenuator.
Zin=46.52+j6.72Ω. From that we can find Mismatch Loss.

Inputs:		
Zload (Ω) Real,Imaginary	46.52	6.72
	Real	Imaginary
Zo	50	
Calculate		
Results:		
Zl (Ω)	46.52	6.720
Zl' (Ω)	0.9304	0.1344
Yl (S)	0.02106	-0.003042
Yl' (S)	1.053	-0.1521
S11	-0.03106	0.07179
	ρ	θ (°)
Γ	0.07822	113.4
	pu	dB
VSWR	1.17	1.36
Return Loss	163.5	22.13
Mismatch Loss	1.006	0.03

MismatchLoss is 0.03dB.
Loss (to mean PowerIn/PowerOut) can be calculated in dB as -|S21|-LoadAttenuator-MismatchLoss=–18.64-18.16-0.03=0.450dB, or an efficiency of 10^(-0.45/10)=90.2%.
Note that there is some uncertainty in the measurements, but we can be confident that the loss is no where near the figure estimated for the FT82-43 design.
Compensation
A 100pF silvered mica was connected in shunt with the transformer primary. This is not an optimal value, benefit may be obtained by exploring small changes to that value.



Above is a sweep of the roughly compensated transformer. The capacitor makes very little difference to the low frequency behavior, but it reduces the input VSWR significantly at the high end. VSWR<1.8 over all of HF.
Comparative power handling
This transformer has more surface area than a FT82-43 based one, so it has higher capacity to dissipate heat, and it is more efficient, so it will have higher power capacity than the FT82-43 based one.
Real antennas
The tests here were using a dummy load on the transformer, and that did allow confirmation of the design and expected loss at 3.6MHz.
Real end fed antennas operated harmonically do not present a constant impedance, not even in harmonically related bands. Note that the resonances do not necessarily line up harmonically, there is commonly some enharmonic effect.
Being a more efficient design that some, it might result is a wider VSWR excursion that those others as transformer loss can serve to mask the variations in the radiator itself.
Does it matter?
Well, in ham radio, everything works. But systems that work better increase the prospects of contacts. ~ *F5RDS*

International Lighthouse Weekend
Weekend 17th-18th August 2019

ILLW started in the Northern Hemisphere 1998 the AYR Radio Group was looking to create an event for their members during summer that was part field day, and something that would be novel and interesting. Also to give the hobby exposure to the public. The Scottish Northern Lights Award was created, for the 3rd weekend in August.

Today some 40 countries are involved, with around 500 lighthouses being registered and activated that weekend. It's not a contest but an opportunity to work a field day operation from a lighthouse, or in some cases from the comfort of a maritime museum. Working from a maritime museum, also provides an opportunity to share and expose our hobby to the general public.

It's a good fun weekend, and you may see parts of our coastline, that you may not normally travel to.

To participate in the weekend, visit www.illw.net, guidelines are there, plus a registration page.
Also, a list of lighthouses, you can also Google Lighthouses Australia, has an excellent list of lighthouses, go to the Victorian section.

Turn a Computer Power Supply into Bench Power
https://makezine.com/projects/computer-power-supply-to-bench-power-supply-adapter/

NEXT SUNSPOT CYCLE MAY BE 50% LOWER

NASA report research now underway may have found a reliable new method to predict this solar activity
The Sun's activity rises and falls in an 11-year cycle. The forecast for the next solar cycle says it will be the weakest of the last 200 years. The maximum of this next cycle – measured in terms of sunspot number, a standard measure of solar activity level – could be 30 to 50% lower than the most recent one. The results show that the next cycle will start in 2020 and reach its maximum in 2025.

PIZZA AT THE SPACE STATION IS JUST PIE IN THE SKY

Owen Garriott W5LFL, who became a Silent Key earlier this year, may have been the first astronaut to make an amateur radio call from the International Space Station but the distinction of receiving the first pizza delivered there is the proud province of cosmonaut Yuri Usachov.
In 2001, Pizza Hut restaurant chain sent the six-inch-in-diameter delicacy, topped with more travel-friendly salami instead of pepperoni, at a cost equivalent to about $1 million U.S. dollars.
The vacuum-sealed meal was prepared and perfected in Kazakhstan, where the Russian space program is headquartered. NASA, of course, was able much later to send pizza-making meal kits to the astronauts who in December 2017 and as recently as this past April have had pizza parties in space.
As the world celebrates the 50th anniversary of the Apollo moon landing, let us all consider this encouraging thought -- that with a little effort, pie in the sky is indeed within the reach of all of us.

~WIA News

SHEPPARTON HAMFEST
Sunday 8th September
St Augustine's Hall
Orr Street Shepparton
Call in on Mount Wombat Repeater 146.650 MHz

A SENIORS PERSPECTIVE OF FACEBOOK

For those of my generation who do not, and cannot, comprehend why Facebook exists:

I am trying to make friends outside of Facebook while applying the same principles.

Therefore, every day I walk down the street and tell passers-by what I have eaten, how I feel at the moment, what I have done the night before, what I will do later and with whom.

I give them pictures of my family, my dog, and of me gardening, taking things apart in the garage, watering the lawn, standing in front of landmarks, driving around town, having lunch, and doing what anybody and everybody does every day.

I also listen to their conversations, give them the "thumbs up" and tell them I like them.

And it works just like Facebook.

I already have four people following me:

Two police officers,

A private investigator,

And a psychiatrist.

~Anon

NEVARC Nets

40M Net

Monday, Wednesday and Fridays
10am Local time (East coast)
7.095 MHz LSB
Approximately + or - QRM
Hosted by Ron VK3 AHR

80M Net

Wednesday 20:30 Local time
3.622 MHz LSB
Hosted by Ron VK3 AHR
Using the club call VK3ANE

2M Nets

Monday at 2000 local time on
VK3RWO repeater
146.975 MHz

President, VK2VU, Gary
Vice President, Tom VK3NXT
Secretary, VK2FKLR, Kathleen
Treasurer, Amy

NEVARC CLUB PROFILE

History

The North East Victoria Amateur Radio Club (NEVARC) formed in 2014.
As of the 7th August 2014, Incorporated, Registered Incorporation number A0061589C.
NEVARC is an affiliated club of the Wireless Institute of Australia.

Meetings

Meetings details are on the club website, the Second Sunday of every month, check for latest scheduled details.
Meetings held at the Belviour Guides Hall, 6 Silva Drive West Wodonga.
Meetings commence with a BBQ (with a donation tin for meat) at 12pm with meeting afterwards.
Members are encouraged to turn up a little earlier for clubroom maintenance.
Call in Via VK3RWO, 146.975, 123 Hz tone.

VK3ANE NETS

HF
7.095 MHz Monday, Wednesday, Friday - 10am Local time
3.622 MHz Wednesday - 8.30pm Local time

VHF
VK3RWO Repeater 146.975 MHz – Monday - 8pm Local time
All nets are hosted by Ron Hanel VK3AHR using the club callsign VK3ANE

Benefits

To provide the opportunity for Amateur Radio Operators and Short Wave Listeners to enhance their hobby through interaction with other Amateur Radio Operators and Short Wave Listeners. Free technology and related presentations, sponsored construction activities, discounted (and sometimes free) equipment, network of likeminded radio and electronics enthusiasts. Excellent club facilities and environment, ample car parking.

Website: www.nevarc.org.au
Facebook: www.facebook.com/nevicARC/

Postal: **NEVARC Secretary**
PO Box 69
Wahgunyah Vic 3683

All editors' comments and other opinions in submitted articles may not always represent the opinions of the committee or the members of NEVARC, but published in spirit, to promote interest and active discussion on club activities and the promotion of Amateur Radio.
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Please include a stamped self-addressed envelope if you require your submission notes returned.
Email attachments not to exceed 5 Mb in file size. If you have more than 5 Mb, then send it split, in several emails to us.
Attachments of (or thought to be) executable code or virulently affected emails will not be opened.
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Other articles credited to outside sources should ask for their permission if they are used.
While we strive to be accurate, no responsibility taken for errors, omissions, or other perceived deficiencies, in respect of information contained in technical or other articles.
Any dates, times and locations given for upcoming events please check with a reliable source closer to the event.
This is particularly true for pre-planned outdoor activities affected by adverse weather etc.
The club website http://nevarc.org.au/ has current information on planned events and scheduled meeting dates.
You can get the WIA News sent to your inbox each week by simply clicking a link and entering your email address found at www.wia.org.au The links for either text email or MP3 voice files are there as well as Podcasts and Twitter. This WIA service is FREE.